REMARKS

In the Office Action of October 10, 2007, the Examiner issued an election requirement and indicated that claims 1 and 19 are generic. The applicant elects claims 1 and claim 2 which depends from claim 1. Claims 19, 20, 23-26 and 28-39 are withdrawn with traverse. The applicant retains the right to present claims 19, 20, 23-26 and 28-39 in a divisional application.

Claim 1 was amended to correct two format errors. A semicolon was placed at the end of limitation (g). The word "and" was added before the last limitation (j).

The applicant objects to the election requirement because the International Bureau did not find multiple inventions and did not require an election requirement. Under MPEP 1850, Section II, Determination Of "Unity Of Invention" there is the statement in the fifth paragraph, "From the preceding paragraphs <u>it is clear that the decision with respect to unity of invention rests with the International Searching Authority or the International Preliminary Examining Authority</u>." The applicant submits that the Examiner's election requirement contradicts the ISA's proper finding that claims of the pending application comply with the unity of invention requirement.

In the Office Action, the Examiner also states that "[e]ach of the listed Species above, has special technical features mutually exclusive to each species that are not required by any of the other listed species." The Applicant respectfully disagrees with this statement. All limitations of claims 1 and 19 have been listed in the table below. Each limitation of claim 1 has a corresponding limitation in claim 19.

Claim 1	Claim 19
A method of designing a two-mirror high numerical aperture imaging device comprising the steps of:	A high numerical aperture imaging device comprising:
(a) determining the positioning of each consecutive point of a cross-section through the x-axis of a first mirror and a second mirror, iteratively for a cross-section in the plane $z = 0$, where the x and y coordinates of each successive point on the two mirrors in the cross-section are $M_1(t) \equiv (m_{1,x}(t), m_{1,y}(t), 0)$ (for the first mirror) and $M_2(t) \equiv (m_{2,x}(t), m_{2,y}(t), 0)$ (for the second), t being an iteration counter; where the functions $M_0(t) \equiv (m_{0,x}(t), m_{0,y}(t), 0) \equiv (f, 0, 0)$ and $M_3(t) \equiv (m_{3,x}(t), m_{3,y}(t), 0) \equiv (0,0,0)$ are set to define the centres of the object and image planes respectively;	a first mirror and a second mirror, wherein the positioning of each consecutive point of a cross-section through the x-axis of a first mirror and a second mirror is determined iteratively for a cross-section in the plane $z = 0$, where the x and y coordinates of each successive point on the two mirrors in the cross-section are $M_1(t) \equiv (m_{1,x}(t), m_{1,y}(t), 0)$ (for the first mirror) and $M_2(t) \equiv (m_{2,x}(t), m_{2,y}(t), 0)$ (for the second), t being an iteration counter; where the functions $M_0(t) \equiv (m_{0,x}(t), m_{0,y}(t), 0) \equiv (f, 0, 0)$ and $M_3(t) \equiv (m_{3,x}(t), m_{3,y}(t), 0) \equiv (0,0,0)$ are set to define the centres of the object and image planes respectively;
(b) Calculating the angle $d_i(t)$ (for $i = 0, \ldots, 2$) that a ray from $M_i(t)$ to $M_{i+1}(t)$ makes to the x-axis, i.e. $d_i(t) = \arctan\left(\frac{m_{i+1,y}(t) - m_{i,y}(t)}{m_{i+1,x}(t) - m_{i,x}(t)}\right)$	wherein the angle $d_i(t)$ (for $i = 0, \ldots, 2$) that a ray from $M_i(t)$ to $M_{i+1}(t)$ makes to the x-axis is given by: $d_i(t) = \arctan\left(\frac{m_{i+1,y}(t) - m_{i,y}(t)}{m_{i+1,x}(t) - m_{i,x}(t)}\right)$
(c) Calculating the distance $p_i(t)$ (for $i = 0, \ldots, 2$) between $M_i(t)$ and $M_{i+1}(t)$, i.e. $p_i(t) = \sqrt{(m_{i+1,x}(t) - m_{i,x}(t))^2 + (m_{i+1,y}(t) - m_{i,y}(t))^2}$	wherein the distance $p_i(t)$ (for $i = 0, \ldots, 2$) between $M_i(t)$ and $M_{i+1}(t)$ is given by: $p_i(t) = \sqrt{(m_{i+1,x}(t) - m_{i,x}(t))^2 + (m_{i+1,y}(t) - m_{i,y}(t))^2}$
(d) Calculating the angle $a_i(t)$ that a tangent to the i'th surface makes to the x-axis, taking $a_0(t)$ and $a_3(t)$ to be the angles that the object and image planes make to the x-axis (being 90° for all t for the surfaces to be rotationally symmetric about the x-axis), i.e. for reflection (for $i = 1$ and 2): $a_i(t) = \frac{d_i(t)}{2} + \frac{d_{i-1}(t)}{2}$	wherein the angle $a_i(t)$ that a tangent to the i'th surface makes to the x-axis, taking $a_0(t)$ and $a_3(t)$ to be the angles that the object and image planes make to the x-axis (being 90° for all t for the surfaces to be rotationally symmetric about the x-axis), i.e. for reflection (for $i = 1$ and 2), is given by: $a_i(t) = \frac{d_i(t)}{2} + \frac{d_{i-1}(t)}{2}$

(e) Choosing the values of $m_{i,x}(0)$ and $m_{i,y}(0)$ (for i = 1 and 2) so that the resulting mirror layout satisfies the sine criterion, and wherein for a far away source (say along the negative x-axis, say $f = -10^9$) a scale parameter, b may be set equal to unity (without loss of generality, such that $B = b/p_0(0) = 1/p_0(0)$), and wherein the sine criterion is then satisfied if: $m_{1,y}(0) = \pm \frac{m_{2,y}(0)}{\left(m_{2,x}(0)^2 + m_{2,y}(0)^2\right)^{1/2}}$	wherein the values of $m_{i,x}(0)$ and $m_{i,y}(0)$ (for i = 1 and 2) are chosen so that the resulting mirror layout satisfies the sine criterion; wherein for a far away source (say along the negative x-axis, say $f = -10^9$) a scale parameter, b may be set equal to unity (without loss of generality, such that $B = b/p_0(0) = 1/p_0(0)$); wherein the sine criterion is then satisfied if: $m_{1,y}(0) = \pm \frac{m_{2,y}(0)}{\left(m_{2,x}(0)^2 + m_{2,y}(0)^2\right)^{1/2}}$
(f) Iterating either from shallower angles to more oblique angles, or vice versa (switching between the two being achieved by using as seed values later iterated results and reversing the sign of the iteration step size h), such that if the iteration is from highly oblique angles then set $m_{2,x}(0)$ equal to a small number close to zero, say 10^{-9}, and choose $m_{1,x}(0) = q_1$ and $m_{2,y}(0) = q_2$, where q_1 and q_2 are arbitrary real numbers (positive or negative), but with the choice of signs of q_1, q_2 and h constrained so as not to have simultaneously the sign of q_1 negative, the sign of q_2 positive and the sign of h positive, then $m_{1,y}(0)$ will need to be ± 1 for the initial parameters to satisfy the sine criterion, and without loss of generality it is possible to choose $m_{1,y}(0)$ to be -1;	wherein iterating either from shallower angles to more oblique angles, or vice versa (switching between the two being achieved by using as seed values later iterated results and reversing the sign of the iteration step size h), such that if the iteration is from highly oblique angles, then set $m_{2,x}(0)$ equal to a small number close to zero, say 10^{-9}, and choose $m_{1,x}(0) = q_1$ and $m_{2,y}(0) = q_2$, where q_1 and q_2 are arbitrary real numbers (positive or negative), but with the choice of signs of q_1, q_2 and h constrained so as not to have simultaneously the sign of q_1 negative, the sign of q_2 positive and the sign of h positive, then $m_{1,y}(0)$ will need to be ± 1 for the initial parameters to satisfy the sine criterion; and wherein without loss of generality it is possible to choose $m_{1,y}(0)$ to be -1;
(g) Choosing the sign Z so that the sine criterion remains satisfied as t changes,	wherein the sign Z is chosen so that the sine criterion remains satisfied as t changes;
(h) Updating the values of $M_i(t)$ as follows (for a small value of h): $M_i(t+1) \equiv \begin{pmatrix} m_{i,x}(t+1) \\ m_{i,y}(t+1) \end{pmatrix} = M_i(t) + w_i \begin{pmatrix} \cos(a_i(t)) \\ \sin(a_i(t)) \end{pmatrix} h$ where $r_{i-1}(t) = \sin\left(a_{i-1}(t) - d_{i-1}(t)\right)$ $s_i(t) = \sin\left(a_i(t) - d_{i-1}(t)\right)$ and where $w_2 = \frac{p_1 r_0}{p_0 s_2}$ $w_1 = -ZB\frac{p_1 s_3}{p_2 r_1}$	wherein the values of $M_i(t)$ are updated as follows (for a small value of h): $M_i(t+1) \equiv \begin{pmatrix} m_{i,x}(t+1) \\ m_{i,y}(t+1) \end{pmatrix} = M_i(t) + w_i \begin{pmatrix} \cos(a_i(t)) \\ \sin(a_i(t)) \end{pmatrix} h$ where $r_{i-1}(t) = \sin\left(a_{i-1}(t) - d_{i-1}(t)\right)$ $s_i(t) = \sin\left(a_i(t) - d_{i-1}(t)\right)$ and where $w_2 = \frac{p_1 r_0}{p_0 s_2}$ $w_1 = -ZB\frac{p_1 s_3}{p_2 r_1}$
(i) Ending the iteration no later than when light rays cease to be able to pass freely through the mirror arrangement, once it has been rotated as in (j);	wherein the iteration is ended no later than when light rays cease to be able to pass freely through the mirror arrangement, once it has been rotated as in step (j); and
(j) Rotating the curves produced above around the x-axis to define the complete, three-dimensional mirror surfaces.	wherein the curves produced above are rotated around the x-axis to define the complete, three-dimensional mirror surfaces.

Because the limitations of claims 1 and 19 are substantially similar, the applicant respectfully submits that there are no technical features that are mutually exclusive to either species. For the all of the reasons discussed above, the applicant submits that the election requirement is erroneous.

The applicant respectfully requests that the election requirement be removed. The applicant also requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

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Dated: November 8, 2007

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